

Application Number 09/978,000
Amendment dated September 30, 2005
Reply to Office action of June 3, 2005

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1 to 5 (cancelled)

Claim 6 (currently amended) : A method as claimed in claim 3, A method of pattern matching for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale structure of the image, said deriving at least one target primitive representative of a large scale structure of the image comprises:

detecting geometric features within the image;

analyzing the detected geometric features to find large scale structures of the image;

approximating each large scale structure with at least one respective primitive, said approximating comprises:

mapping a respective primitive through at least a sub-set of the geometric features forming the large scale structure, wherein the step of mapping a respective primitive comprises a step of finding a largest primitive that can be mapped along the respective large scale structure, consistent with a predetermined maximum error tolerance between the primitive and the geometric features spanned by the primitive;

deriving a basis from at least one of the primitives; and

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representing each of the primitives as invariants in the derived basis; and

for each target primitive:

identifying any model primitives that at least partially match the target primitive; and

for each identified model primitive, calculating a figure of merit indicative of a degree of correspondence between the target primitive and the model primitive.

Claim 7 (original) : A method as claimed in claim 6, wherein the step of mapping a primitive further comprises a step of forcing end-points of each primitive to lie on respective ones of the geometric features spanned by the primitive.

Claim 8 (original) : A method as claimed in claim 6, wherein, when a single large scale structure of the image is approximated by a respective set of two or more primitives, the step of mapping a primitive further comprises a step of forcing adjacent ones of the set of primitives to intersect at respective adjoining end points.

Claims 9 to 11 (cancelled)

Claim 12 (currently amended) : A method as claimed in claim 9, A method of pattern matching for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale structure of the image, said deriving at least one target primitive representative of a large scale structure of the image comprises:

detecting geometric features within the image;

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analyzing the detected geometric features to find large scale structures of the image;
approximating each large scale structure with at least one respective primitive;
deriving a basis from at least one of the primitives, said deriving a basis from at least one of the primitives comprises:
calculating an origin of a respective local coordinate system,
wherein the step of calculating an origin comprises a step of calculating an intersection point of a pair of extrapolated primitives; and
calculating an orientation of the respective local coordinate system; and
representing each of the primitives as invariants in the derived basis; and
for each target primitive:
identifying any model primitives that at least partially match the target primitive; and
for each identified model primitive, calculating a figure of merit indicative of a degree of correspondence between the target primitive and the model primitive.

Claim 13 (original) : A method as claimed in claim 12, wherein the step of calculating an origin comprises a step of calculating a centroid of two or more intersection points.

Claim 14 (original) : A method as claimed in claim 13, wherein each intersection point is weighted by lengths of the respective primitives used to calculate the intersection point.

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Claims 15 to 18 (cancelled)

Claim 19 (currently amended) : ~~A method as claimed in claim 1, A method of~~
pattern matching for recognition of objects within an image using a model defined
by a set of one or more model primitives representative of large scale structures
of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale
structure of the image; and

for each target primitive;

identifying any model primitives that at least partially match the
target primitive; and

for each identified model primitive, calculating a figure of merit
indicative of a degree of correspondence between the target
primitive and the model primitive;

wherein a hash table is used to store references to each of the model
primitives, and wherein the step of identifying model primitives
comprises the steps of:

mapping the target primitive to the hash table;

identifying any bins of the hash table crossed by the target primitive;
and

inspecting each of the identified bins to identify each model
primitive referenced in any of the identified bins.

Claim 20 (original) : A method as claimed in claim 19, wherein the step of
mapping the target primitive to the hash table comprises a step of mapping end-
points of the target primitive to respective end-point bins of the hash table.

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Claim 21 (original) : A method as claimed in claim 20, wherein the step of identifying bins crossed by the target primitive comprises a step of identifying any intermediate bins crossed by a line extending between the end-point bins and tracing a path of the target primitive projected onto the hash table.

Claim 22 (currently amended) : ~~A method as claimed in claim 1,~~ A method of pattern matching for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype, the method comprising steps of:

deriving at least one target primitive representative of a large scale structure of the image; and

for each target primitive:

identifying any model primitives that at least partially match the target primitive; and

for each identified model primitive, calculating a figure of merit indicative of a degree of correspondence between the target primitive and the model primitive;

wherein the step of calculating a figure of merit comprises a step of calculating an orthogonal projection of the target primitive onto the model primitive.

Claim 23 (original) : A method as claimed in claim 22, wherein the step of calculating an orthogonal projection comprises calculating a length of a portion of the model primitive in respect of which the target primitive lies within a predetermined error corridor about the model primitive.

Claim 24 (original) : A method as claimed in claim 23, wherein the predetermined error corridor is selected based on an expected error tolerance in the location of detected local features relative to the target primitive.

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Claim 25 (original) : A method as claimed in claim 22, further comprising a step of accumulating orthogonal projection lengths calculated in respect of each model primitive.

Claim 26 (original) : A method as claimed in claim 25, wherein each model primitive is associated with a respective model basis, and wherein the step of accumulating orthogonal projection lengths comprises, for each model basis, a step of calculating a sum of the orthogonal projection lengths calculated in respect of model primitives associated with the model basis.

Claim 27 (original) : A method as claimed in claim 26, further comprising, for each model basis, steps of:

calculating a respective relative coverage indicative of a proportionality between the respective calculated sum of orthogonal projection lengths and a predetermined total length of the model primitives; and

selecting, as a candidate basis, the model basis having the highest relative coverage.

Claims 28 and 29 (cancelled)

Claim 30 (currently amended) : ~~A method as claimed in claim 28, further comprising the steps of:~~ A method of deriving a model for use in a pattern matching method for recognition of objects within an image using a model defined by a set of one or more model primitives representative of large scale structures of an archetype,

the pattern matching method comprising the steps of:

deriving at least one target primitive representative of a large scale structure of the image; and

for each target primitive:

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identifying any model primitives that at least partially match
the target primitive; and
for each identified model primitive, calculating a figure of merit
indicative of a degree of correspondence between the
target primitive and the model primitive;
wherein the method of deriving a model comprises the steps of:
deriving at least one model primitive representative of large scale
structures of an archetype;
sampling each model primitive at two or more respective sample
locations;
mapping each sample location to a respective sample bin of a hash
table;
inserting a reference to the respective model primitive in the sample
bin;
defining a respective error bar about each sample, the error bar
reflecting an expected error tolerance in the location of
detected geometric features relative to the primitive;
mapping each error bar to corresponding error bar bins in the hash
table; and
inserting a reference to the respective model primitive in each of the
error bar bins.

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